

PLANT MATERIALS TECHNICAL NOTE

A Guide to Understanding Seed Labels for Seeding Certification

Understanding the components of a seed label (or tag) is important when purchasing seed for conservation plantings. Seed labels provide the information needed to verify the quality and amount of seed in the lot. Labels for seed mixes are especially complicated and often inadequately labeled by vendors and not clearly understood by the end user. This Technical Note describes the components of a seed label and what information is needed for seeding certification.

Components of a Seed Label:

Name: The variety and species name. Seed labels should include the variety name, if known; otherwise VNS (variety not stated).

Lot Number: This is a series of letters and/or numbers assigned by the grower for tracking purposes. All seed sold requires a lot number.

Bad River blue grama		Lot SG-21-E12	
Purity	90.00%	Germ	80%
Crop	3.30%	Dorm Seed	10%
Inert	6.66%	Total Germ	90%
0 Weed	0.04%	Origin	ND
Noxious Weed	0.00%	Net Weight	40 lbs.
		Test Date	12/28/20
XYZ Elevator, 123 Harvest Way, Bismarck, ND 58502			

Purity: Pure seed or purity is the percent of seed in the lot that is the stated species. For example, a purity of 90% indicates that 10% of the bag content is inert matter (chaff), weed seed, or other crop seed.

Other Crop: The percent by weight that is a crop other than the seed species labeled. It does not include weeds. The crop seed must be listed by name if it is more than 5% of the content. This includes annual crops, and grass and forb species that are not the target species (Figure 1).

Inert: The percent by weight of chaff, sticks, dirt, and other debris. High inert percentages could affect the drill seedflow. Coated seeds have high inert values caused by the coating material.



Figure 1. Seed lot containing inert matter and other crop seed.

Weed Seed: The percentage of common and restricted weed seed in a lot.

Noxious Weeds: Each state defines noxious weed species that are restricted or prohibited, as well as the maximum allowable amount of seed of restricted noxious weeds. Restricted noxious weeds must be listed by name, and total seeds per pound identified on the label. Seed containing prohibited noxious weed seeds cannot be sold and planted in the state where it is listed as prohibited. Note: State law regulating noxious weed *seeds* may be different from law regulating noxious weed *plants*. To access the noxious weed seed list per state, search the USDA AMS website for Regulatory Programs, Federal Seed Act, and State Noxious-Weed Seed Requirements.

Note: Adding the percent of each component should equal 100%.

$$\% \text{ Purity (single species)} + \% \text{ weed seed} + \% \text{ other crop} + \% \text{ inert} + \% \text{ noxious weed seed} = 100\%$$

Germination: The percentage of seed that germinates in a set time period under specific lab conditions. It determines the capability of a seed lot to produce normal seedlings under favorable conditions (Figure 2). A tetrazolium test (TZ) is a rapid (24 to 48 hour) chemical viability test that is sometimes used as an *estimate* of germination; however, it *cannot* be used as a legal substitute for the germination test on the seed label.

Dormant Seed or Hard Seed: The portion of seed sample that does not germinate during the time period of the seed test but is determined to be alive and respiring. Hard seed is a type of dormant seed that has a seedcoat impermeable to water.

Total Germination (aka Total Viability): The germination percentage plus the hard/dormant seed percentage. For example, 80% germination and 10% dormant seed equals a total viability of 90%.

Origin: The location where seed was grown. For NRCS programs, there is no restriction on origin of named varieties, but they must be included in the state NRCS plant materials list of accepted named varieties for each species (see FOTG Section 1 for Plant Materials Technical Notes).



Figure 2. Laboratory germination tests determine the ability of seed to produce seedlings in favorable conditions.

Test Date: The month and year of the germination test. For use in NRCS programs, the test date for grasses and forbs (excluding the test month) can be no older than 12 months in Montana when purchased within the states, and 6 months when purchased outside of the states.

Net Weight: The bulk weight of the material in the bag.

Name and Address of Seller: The name and address of the seller.

Seed Mixture Labels:

Grasses and forbs are frequently sold as mixtures. In addition to the basic information above, a label for a seed mixture should include:

- **Individual species purity and germination** (including hard and dormant seed) percentages and origin of each kind of seed.
- Percent (%) **Pure Seed** for each component as a percent of the whole. To determine if all components of the mixture have been accounted for: % pure seed of each species + % weed seed + % other crop + % inert + % noxious weed seed = 100%
- Per federal code, identification that seed is a mixture.
- For Montana, an Alternative Dispute Resolution statement may be required as a prerequisite to legal action based upon the failure of the agricultural seed to produce as represented.

There are numerous sources of guidance on the information required on a proper and legal seed label for individual species, but guidance on seed mixtures (such as cover crop mixes) is often misinterpreted by vendors and even state and federal governmental entities, resulting in various and sometimes improper seed label formats.

Important Notes Regarding Seed Label Components:

- It *is not* the responsibility of the NRCS Conservation Planner to make sure seed labels are properly labeled according to state and federal requirements.
- It *is* the responsibility of the Planner to make sure information needed for certification is included on the seed mixture label.

Certifying Seedings in Montana:

- The requirements for certifying a conservation practice as implemented is a function of what is on the Implementation Requirements (IR) form and supported by the Conservation Practice Standard (CPS) and Specification.
- Following the IR sheet is required because it provides documentation that the practice was planned, designed, and certified as implemented (three phases of practice delivery) prior to practice payment.
- The IR Certification Worksheet requires the *percent purity* and *percent germination* be entered *per species* to calculate the amount of Pure Live Seed (PLS) planted of *each species*. The Certification Worksheet requires PLS by species because it demonstrates adequate amounts of live seeds for each species has been seeded and each species is represented in the planned proportion of the seed mix.
- The amount of PLS planted should be within the allowable percent of planned PLS seed per acre (PLS/ac) specified in the Conservation Practice Standard, Practice Specification, and/or Implementation Requirements. For example, for Range Plantings (CPS 550), PLS lb/ac seeded needs to be within $\pm 10\%$ of the planned seeding rate per acre (Figure 3). For Conservation Practices that do not specify an allowed range, use $\pm 10\%$ as a ‘rule-of-thumb’ to ensure enough PLS is used for the seeding to meet specifications while avoiding excess seed amounts that can inflate seeding cost. For example, if a seeding requires 1X amount of seed but the producer purchases and seeds 2X, the excess seed costs the producer more and is not needed if seeding recommendations are followed. If the producer only seeds 0.7X, then the producer is not seeding enough seed to establish a successful stand. Discuss variations in the 90% to 110% ‘rule-of-thumb’ with your Area Specialists prior to certification.

Figure 3. Certification Worksheet table displaying the actual species composition, seeding rates, and PLS seeded. The ‘Percent of Planned (PLS/ac)’ should be within 90% to 110%.

Select Species	Enter Cultivar	Enter Planned Rate (PLS lb/ac)	Enter Bulk Rate Planted (lb/field)	Bulk Planted (lb/ac)	Enter Purity (%)	Enter Germination (%)	Seeds/lb	Actual PLS lb/ac	PLS/ft ²	Percent of Planned (PLS/ac)
bluegrass, Nevada	Opportunity	1.0	1.2	1.20	95.0%	90.0%	1,029,000	1.03	24.2	103%
wheatgrass, bluebur	Anatone	5.0	5.7	5.70	90.0%	92.0%	139,000	4.72	15.1	94%
needlegrass, green	Lodorm	2.0	3.5	3.50	95.0%	65.0%	186,000	2.16	9.2	108%

Seed Label Examples: The following examples of seed mixture labels explain the completeness (or lack thereof) of each label and describe the types of information that can and cannot be gleaned from each label. When needed certification information is lacking, conservation planners will need to contact the seed vendor for additional information. This Technical Note provides several common examples but should not be considered comprehensive in terms of describing all potential label variations. For additional assistance, contact Plant Materials Staff.

Example 1. A mostly compliant seed mixture label that lacks certification information.

Good Label Seed Supply Company
 123 Main Street
 Anywhere, USA Zip Code

Total LBS: 2,345.40
 Total Acres 198 acres

Lot: 21-9999
 Net Weight: 50 lbs
 Germ Test Date: 2/13/2021

Jane Producer

Kind	Origin	% Pure Seed	% Germ.	% Hard Dormant	% Total Viability
Manifest intermediate wheatgrass	CAN	29.00	85	0	85
Rosana western wheatgrass	ND	27.75	94	2	96
Manska pubescent wheatgrass	MT	25.41	97	0	97
Revenue slender wheatgrass	CAN	11.38	77	14	91
Ladak alfalfa	CAN	2.54	74	24	98
VNS flax	MT	1.14	97	0	97

Crop: 0.00% Inert: 2.78% Weeds: 0.00% Noxious Weeds: 0.00%

The seed mixture label in Example 1 is *mostly* compliant with Federal Seed Law and state Department of Agriculture requirements, with the exception that for federal code it lacks identification as a mixture. In this case, the % Pure Seed of each component is listed, and that is adequate for state and federal regulations. This label does not provide the percent purity and germination by each species needed for NRCS program purposes, i.e., you could not certify a seeding using this label.

What We Can Learn and Calculate for Certification from *Example 1* Label:

- Regarding regulations, Example 1 seed mixture label has some information not required in state or federal regulations including total pounds and total acres, although this can be useful information. Remember, it *is not* the responsibility of the NRCS Conservation Planner to make sure seed labels are properly labeled according to state and federal requirements. Some vendors do not follow regulations and the result is variations of seed labels.
- The purity of the mixture can be determined by tallying the % Pure Seed of each component in the mix, which adds to 97.22%. However, this total cannot be used for certification.
- The % Pure Seed of each component describes how much, by weight, each component constitutes in the mix. For example, 29.00% of the mixture consists of normal, undamaged Manifest intermediate wheatgrass seeds on a weight basis. Although % Pure Seed is not the same as the Purity of Manifest, it can be used to determine the PLS pounds of Manifest sown.

Using Manifest as an example, let's say 10 pounds of bulk mix were sown over an acre. Since 29% of the mix is pure Manifest, 2.9 bulk pounds of Manifest were sown (10 lbs x 29%/100). If we multiply 2.9 bulk pounds times the total viability of Manifest (85%), we calculate we planted 2.465 PLS pounds of Manifest when sowing 10 bulk pounds of mix. We could do this for each component of the mix, add up the values, and calculate total pounds of PLS mix sown. However, the total pounds PLS of the mix cannot be used for certification.

- Furthermore, we cannot determine the PLS of the mixture (purity x total germination) since the germination values vary by each component of the mix, but we can calculate the number of PLS pounds of mixture sown as described above.
- We cannot back-calculate the % Purity of Manifest (or any other species in the mix) if we only have the % germination and % Pure Seed. The % Purity by species, which is needed for certification, needs to be obtained to calculate PLS per species.
- Since knowing the germination and purity of each species in the mix is a NRCS programmatic requirement for certification using the IR Worksheet, you need to request the original laboratory report of analysis for each individual species in the mix to get the purity by species. Contact the seed vendor for the information.
- We use the purity and germination to calculate the PLS lb/ac planted per species to determine if each species is adequately represented in the seed mix. This ensures that all the weed seed, inert matter, etc. are not associated with only one species in the mix and thereby lowering that species PLS seed rate and representation in the mix.

Example 2. A compliant seed mixture label with complete certification information.

Native Grass/Legume Mixture		Lot G3L22013					
Kind	Variety	Origin	% PureSeed	%Purity	% Germ-ination	% Hard/Dormant	% Total Viability
Big bluestem	Bison	ND	30	95	70	20	90
Little bluestem	Badlands ecotype	ND	30	98	65	-	65
Switchgrass	Forestburg	SD	20	85	80	10	90
Purple prairie clover	Bismarck germplasm	ND	10	92	75	20	95
Weed Seed:	0.50%			Other Crop:		5.00%	
Noxious Weed Seed:	None			Inert matter:		4.50%	
Germ Test Date:	March 2021			Net Weight:		50 lbs	
Labeler	XYZ Elevator, 123 Harvest Way, Bismarck, ND 58502						

The seed mixture label in Example 2 is compliant with Federal Seed Law and state Department of Agriculture requirements. This example varies slightly from the label in Example 1 in that the actual % Purity of each species is provided. This example has all the information needed to certify a seeding.

What We Can Learn and Calculate for Certification from *Example 2* Label:

- With the information in Example 2, we can calculate the PLS of each species in the mix. We have all the information needed to certify the seeding because the % purity and % germination is provided by species.

To calculate the PLS for each species in the mix, use **% PLS = % Purity x % Germination**. For example, % PLS little bluestem: $0.98 \times 0.65 = 64\%$ PLS

If a species has both % germination and % hard/dormant seed, then calculate PLS as % purity x % total viability: **% PLS = % Purity x (% Germination + % Hard/Dormant)**. For example, % PLS switchgrass: $0.85 \times (0.80 + 0.10) = 77\%$ PLS

- If we know the amount of bulk seed sown and % Pure Seed of a species, we can *estimate* the amount of PLS sown for each species. However, this estimate is not used for certification (see Example 1).

Example 3. A non-compliant seed mixture label with individual species information used for certification.

Seed	lbs./A	% Mix	Lot	Origin	Germ	Purity	Other	Inert	Weeds	Test
OMRI Berseem clover	0.5	5.60%	21-ABCD	OR	85.00%	62.99%	0.01%	36.98%*	0.02%	3/1/2021
Pearl millet	1.5	16.70%	21-EFGH	TX	84.00%	98.10%	0.40%	1.50%	0.00%	7/31/2021
Grazing BMR 84 corn	2.5	27.80%	21-IJKL	NE	91.00%	99.41%	0.00%	0.59%	0.00%	2/1/2021
Sweet Six sorghum sudan	2.5	27.80%	21-MNOP	TX	98.00%	99.79%	0.00%	0.21%	0.00%	5/4/2021
Impact forage collards	0.5	5.60%	21-QRST	ID	89.00%	98.97%	0.68%	0.35%	0.00%	2/5/2021
Bayou rape/kale	0.5	5.60%	21-UVWX	OR	94.00%	99.50%	0.00%	0.50%	0.00%	9/4/2021
Black Oil sunflower	1	11.10%	21-YZAB	ND	96.00%	99.47%	0.00%	0.53%	0.00%	1/6/2021
*high inert likely the result of seed coating.										

The seed mixture label in Example 3 is not compliant with Montana regulations or federal seed code but it does have all the information needed to certify a NRCS seeding practice and can be used for certification. To be compliant with regulations, it needs to include vendor name and address, lot number for the total mix, state that it's a mix, and include the percent germination, purity, weeds, and inert displayed for the entire mix as in Example 1. Additional, not required, information on a seed label are pounds per acre (presumably bulk weight) and the % Mix.

What We Can Learn and Calculate for Certification from *Example 3* Label:

- Using the information in Example 3 seed mixture label, the PLS of each species can be readily determined (% purity x % germination) for seeding certification.
- If you know the amount of bulk seed mix sown and the percent of the species in the mix, you can calculate both the number of PLS pounds of each species sown and the total number of PLS pounds of the mix sown (sum of all the individual species PLS).
- Pounds per acre (lbs/A) describes the amount of bulk mix that would be applied of each species per acre if the recommended rate was applied (sum of the lbs/A values = 9 pounds).
- The % Mix is the percent that each species makes up by weight in the mixture on a bulk weight basis.

As an example, if 9 pounds of bulk seed mix were applied per acre, for OMRI Berseem clover, that would

translate into $5.6\%/100 \times 9 \text{ lbs/A} = 0.504$ bulk pounds berseem clover seeded per acre.

By calculating the PLS of OMRI Berseem clover ($62.99\%/100$ purity \times $85.00\%/100$ germination = 0.5354 or 53.54% PLS), we can determine that 0.27 PLS pounds/acre of berseem were sown (0.504 bulk pounds \times $53.54\%/100$ PLS = 0.27 PLS pounds).

Important Seed Label Points:

- Most native plant seed is sold (and should be purchased) on a Pure Live Seed (PLS) basis. Germination and purity will always be variable between seed lots.
- PLS information allows value comparisons of seed lots prior to purchase. When seed is purchased on a PLS basis, the customer pays only for seed that will germinate.
- For NRCS programs, it is the program participant's responsibility to collect and submit *all* seed labels for actual species seeded in each field. Make sure labels include % purity and % germination *per* species.
- Seed mixture labels can vary in format and content depending on how closely vendors follow federal seed law and state regulations. If you have specific questions about the label (PLS versus bulk or the meaning of information), contact the seed vendor. Also contact the Plant Materials staff or the Montana Department of Agriculture for assistance.
- Labeling requirements for mixes are the same as non-mixed lots (such as single species) and must identify the seed as a mixture.
- When terminology such as “pounds per acre” or “% mix” are used, it is important to verify what the labeler means, and if these numbers represent a bulk or PLS value. Call the vendor to verify intent and meaning.
- Since NRCS certification requires the germination (or total viability) and purity of *each species* in the mix, contact the vendor and request the laboratory report of analysis for each species if the information is not provided on the seed label.
- Interpretations and definitions of label information can vary among vendors. When in doubt, contact the vendor for clarification.
- Seed coating is considered inert matter which is reflected in the purity and inert percentages on the label.

Additional Resources:

This guide is not designed to explain all aspects and information required on a legal seed label. Seed labeling is guided by both federal (when seed is purchased from out of state and/or crosses state lines) and state (when seed is sold within state boundaries) regulations. Montana seed law closely follows federal regulations. See the following resources for more information.

- For guidance on federal regulations, see the US Department of Agriculture, Seed Regulatory and Testing Branch, Federal Seed Act, revised 1998: [Federal Seed Act | Agricultural Marketing Service \(usda.gov\)](https://www.usda.gov/seed/FederalSeedAct)
- For guidance on seed labeling requirements in Montana, see [Montana Department of Agriculture](https://www.mt.gov/agriculture) website and Montana Code Annotated Title 80 Agriculture, Chapter 5 Agricultural Seed and Patented Plant Material, Part 1 Seed Labeling-Licensing-Certification: [80-5-123. Label requirements for agricultural, vegetable, flower, and indigenous seeds, MCA \(mt.gov\)](https://legis.mt.gov/80-5-123).
- For training on interpreting and using a seed labels and laboratory reports of analysis, see the [Montana-Wyoming Plant Materials Webinar Series](https://www.mt.gov/agriculture/webinars).
- For additional information on Reading Seed Labels, see USDA-NRCS. 2002. Reading Seed Packaging Labels and Calculating Seed Mixtures, [Plant Materials Technical Note PM-4](https://www.nrcs.usda.gov/technical/PM-4). USDA-NRCS, Boise, ID, 15 pages.

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